

SEDIMENT MOBILITY IN RESPONSE TO TIDAL AND WIND-DRIVEN FLOWS ALONG THE BELGIAN COAST, SOUTHERN NORTH SEA

Baeye Matthias¹, Michael Fettweis², George Voulgaris³ and Vera Van Lancker²

¹ Renard Centre of Marine Geology (RCMG), Department of Geology and Soil Science, Ghent University, Ghent, B-9000, Belgium
E-mail: matthias.baeye@ugent.be

² Management Unit of the North Sea Mathematical Models (MUMM), Royal Belgian Institute of Natural Sciences, Brussels, B-1200, Belgium

³ Department of Earth and Ocean Sciences, University of South Carolina, Columbia, SC 29208, USA

The effect of hydro-meteorological forcings (tidally- and wind-induced flows) on the transport of suspended particulate matter (SPM), on the formation of high concentrated mud suspensions and on the occurrence of sand-mud suspensions has been studied using long-term multi-parametric observations. Data have been collected in a coastal turbidity maximum area (southern North Sea) where a mixture of sandy and muddy sediments prevails. Data have been classified according to variations in subtidal alongshore currents, with the direction of subtidal flow depending on wind direction. This influences the position of the turbidity maximum; as such also the origin of SPM. Winds blowing from the NE will increase SPM concentration, whilst SW winds will induce a decrease. The latter is related to advection of less turbid English Channel water, inducing a shift of the turbidity maximum towards the NE and the Westerschelde Estuary. Under these conditions, marine mud will be imported and buffered in the estuary. Under persistent NE winds, high concentrated mud suspensions are formed and remain present during several tidal cycles. Data show that SPM consists of a mixture of flocs and locally eroded sand grains during high currents. This has implications towards used instrumentation: SPM concentration estimates from optical backscatter sensors will only be reliable when SPM consists of cohesive sediments only; with mixtures of cohesive and non-cohesive sediments, a combination of both optical and acoustic sensors are needed to get an accurate estimate of the total SPM concentration.